# Exercise Solutions for Math 20

Factoring Polynomials and Simplifying Rational Expressions

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# Contents

1	Factor the following completely.	
	1.1 $16x^4 - 1$	
	1.2 $8j^3 - 125k^6$	
	1.3 $s^2 + 7s + 10 \dots $	
	1.4 $4n^2 - 12n + 9$	
	1.5 $x^3 - x^2 - x + 1$	
	1.6 $48 - 13q - q^2$	
2	Reduce the following rational expressions to lowest terms. $2.1  \frac{a^2 - b^2}{a^3 - b^3}  \dots  \dots  \dots  \dots  \dots  \dots  \dots  \dots  \dots  $	
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	$2.1  \frac{a^2 - b^2}{a^3 - b^3}  \dots  \dots  \dots  \dots  \dots  \dots  \dots  \dots  \dots  $	
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# 1 Factor the following completely.

### 1.1 $16x^4 - 1$

$\Rightarrow (4x^2 - 1)(4x^2 + 1)$	Factor using difference of two squares.
$\Rightarrow (2x-1)(2x+1)(4x^2+1)$	Factor using difference of two squares.
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### 1.2 $8j^3 - 125k^6$

$\Rightarrow (2j - 5k^2)(4j^2 + 10jk^2 + 25k^4)$	Factor using difference of two cubes.
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#### 1.3 $s^2 + 7s + 10$

$\Rightarrow (s+2)(s+5)$	Factor by grouping.

### 1.4 $4n^2 - 12n + 9$

$\Rightarrow 4n^2 - 6n - 6n + 9$	Factor by grouping.
$\Rightarrow 2n(2n-3) - 3(2n-3)$	
$\Rightarrow (2n-3)^2$	
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### 1.5 $x^3 - x^2 - x + 1$

$\Rightarrow x^2(x-1) - 1(x-1)$	Factor by grouping.
$\Rightarrow (x^2 - 1)(x - 1)$	
$\Rightarrow (x-1)(x+1)(x-1)$	Factor using difference of two squares.
$\Rightarrow (x-1)^2(x+1)$	
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#### **1.6** $48 - 13q - q^2$

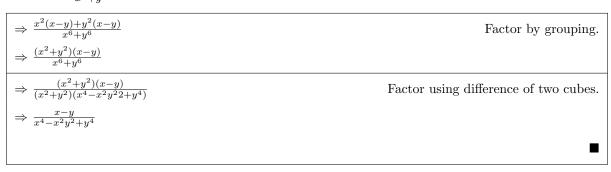
$\Rightarrow -q^2 - 13q + 48$	Rewrite in standard form.
$\Rightarrow -(q^2 + 13q - 48)$	
$\Rightarrow -(q-3)(q+16)$	Factor by grouping.
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# 2 Reduce the following rational expressions to lowest terms.

#### 2.1 $\frac{a^2-b^2}{a^3-b^3}$

$\Rightarrow \frac{(a-b)(a+b)}{a^3-b^3}$	Factor using difference of two squares.
$\Rightarrow \frac{(a-b)(a+b)}{(a-b)(a^2+ab+b^2)}$	Factor using difference of two cubes.
$\Rightarrow \frac{a+b}{a^2+ab+b^2}$	

# 2.2 $\frac{x^3-x^2y+xy^2-y^3}{x^6+y^6}$



#### 3 Perform the following operations and simplify.

# 3.1 $\left(\frac{x}{x^2-1} - \frac{3}{x+1}\right) \div \frac{2x^2-x-3}{x^3-1}$

**3.2** 
$$\left(\frac{x}{x+y} + \frac{y}{x-y}\right) \cdot \frac{x^2 - xy}{x^4 - y^4} \div \frac{x}{x^2 + 2xy + y^2}$$